REMARKS

In the Office Action, the Examiner rejected claims 1, 3, 5, 9, 11-12, 14, and 20 under 35 U.S.C. §102(b) as being anticipated by a paper entitled "Circuit multi-fault diagnosis and prediction error estimation using a committee of Bayesian neural networks" by Brandt, et al. (Brandt). The Examiner rejected claims 2, 4, 6-8, 10, 13, 15, 17-19 under 35 U.S.C. §103(a) as unpatentable over Brandt in view of a paper entitled "A Bayesian approach to variable screening for modeling the IC fabrication process" by Niu, et al. (Niu). Applicants have amended claim 12, but have not added or amended any other claim. Thus, claims 1-20 will be pending in the application after entry of this Amendment.

I. Rejection of claims 1-11 under §102(b) and §103(a)

The Examiner rejected claims 1, 3, 5, 9, and 11 under §102(b) as being anticipated by Brandt. The Examiner also rejected claims 2, 4, 6-8, and 10 under §103(a) as being unpatentable over Brandt in view of Niu.

Claims 1-11 are dependent on claim 1. Claim 1 recites a method that constructs a model that estimates at least one electrical characteristic for an extraction sub-problem. The method identifies a set of physical measurements of integrated circuit components that define the extraction sub-problem. The method selects a set of training cases for the specific extraction sub-problem. Each of the training cases includes an associated set of the physical measurements. The method solves the specific extraction sub-problem for each of the training cases using the associated set of physical measurements as an input to

an accurate physics based model to generate an associated output. The method trains a machine-learning model with Bayesian inference using the associated set of physical measurements and associated outputs as training data.

Applicants respectfully submit that Brandt does not disclose, teach, or even suggest such a method. For instance Brandt does not disclose teach or even suggest a method that:

- constructs a model that estimates at least one electrical characteristic for an extraction sub-problem;
- identifies a set of physical measurements of integrated circuit components that define the extraction sub-problem;
- selects a set of training cases for the specific extraction sub-problem, where each of the training cases includes an associated set of the physical measurements; and
- solves the specific extraction sub-problem for each of the training cases using the associated set of physical measurements as an input to an accurate physics based model to generate an associated output.

The Examiner rejected claims 1 and 9 by citing the last two paragraphs on page 7/1 and the first two paragraphs on page 7/2 of Brandt. The first two paragraphs on page 7/1 are from Brandt's "Introduction," where Brandt states that others have used multilayer perceptrons (MLPs) to recognize (transistor and resistor) faults in amplifiers. *See* Brandt at page 1, paragraph 2. Brandt also states that Bayesian training improves the error-rates

of MLPs. Here, however, Brandt does not disclose, teach, or even suggest any limitation of claim 1.

The next two paragraphs the Examiner cites are under Brandt's heading "The Circuit and Simulated Data Generation." Here Brandt describes the direct recording of resistances, voltages, and times from an amplifier circuit after the presentation of an impulse such as a Dirac impulse. *See* Brandt at page 3. Brandt states that recording data were "extracted" from these input pulse experiments. However, the statement in Brandt that recording data were extracted from experiments has nothing to do with the problem of "extraction" as is understood in the field of electronic design automation (EDA). Since Brandt does not describe EDA extraction, Brandt's recorded data values do not disclose, teach, or even suggest any of the limitations of claim 1 recited above.

The Examiner also cites page 7/2 paragraph 3 to page 7/4 paragraph 4 in Brandt to reject claims 1 and 9. On page 7/2, under the heading "The Bayesian Trained MLP," Brandt generally describes Bayesian trained MLPs. Finally, from pages 7/3 to 7/4, under the heading "Prediction Error Estimation," Brandt discusses predicting the errors of Bayesian trained MLPs using Bayesian statistical theory. However, here also, Brandt does not disclose, teach, or even suggest any of the limitations of claim 1 recited above because Brandt discusses Bayesian trained MLPs only in relation to predicting their error "bars" (error-rates based on variance and standard deviation).

Next the Examiner rejected claims 3, 5, and 11 by citing page 7/4 and Figure 1 in Brandt. Regarding Figure 1, the Examiner states "wire and neural network are illustrating in Fig. 1." However, Applicants respectfully submit that no neural network is shown in

Brandt's Figure 1. Brandt's Figure 1 only shows the differential amplifier circuit described by Brandt as being tested for error.

Moreover, Applicants respectfully submit that page 7/4 of Brandt discusses error estimation for resistance values of a faulty amplifier circuit. This has nothing to do with EDA extraction. Since Brandt discusses error estimation, Applicants respectfully submit that Brandt does not disclose, teach or even suggest the method of claim 1.

Accordingly, Applicants respectfully submit that Brandt neither anticipates claim 1, nor otherwise renders this claim invalid. As claims 2-11 are dependent on claim 1, Applicants respectfully submit that these claims are also patentably distinguishable from Brandt for at least the reasons discussed above in relation to claim 1. In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the §102(b) rejection of claims 1, 3, 5, 9, and 11 and the §103(a) rejection of claims 2, 4, 6-8, and 10.

II. Rejection of claims 12-20 under §102(b) and §103(a).

The Examiner rejected claims 12, 14, 16, and 20 under §102(b) as being anticipated by Brandt. The Examiner also rejected claims 13, 15, and 17-19 under §103(a) as being unpatentable over Brandt in view of Niu.

Claims 13-20 are dependent on claim 12. Claim 12 recites a computer readable medium containing a set of instructions for constructing a model for estimating at least one electrical characteristic for an extraction sub-problem. The instructions identify a set of physical measurements of integrated circuit components that define the extraction sub-problem. The instructions select a set of training cases for the specific extraction sub-problem. Each of the training cases include an associated set of the physical

measurements. The instructions solve the specific extraction sub-problem for each of the training cases using the associated set of physical measurements as an input to an accurate physics based model to generate an associated output. The instructions train a machine-learning model with Bayesian inference using the associated set of physical measurements and associated outputs as training data.

Applicants respectfully submit that Brandt does not disclose, teach, or even suggest the computer readable medium of claim 12. For instance, Brandt does not disclose, teach, or even suggest a computer readable medium that contains a set of instructions for constructing a model for estimating at least one electrical characteristic for an extraction sub-problem by:

- constructing a model that estimates at least one electrical characteristic for an extraction sub-problem;
- identifying a set of physical measurements of integrated circuit components that define the extraction sub-problem;
- selecting a set of training cases for the specific extraction sub-problem, where each of the training cases includes an associated set of the physical measurements; and
- solving the specific extraction sub-problem for each of the training cases using the associated set of physical measurements as an input to an accurate physics based model to generate an associated output.

The Examiner rejected claims 12 and 20 by citing the last two paragraphs on page 7/1 and the first two paragraphs on page 7/2 of Brandt. The first two paragraphs on page

7/1 are from Brandt's "Introduction," where Brandt states that others have used multilayer perceptrons (MLPs) to recognize (transistor and resistor) faults in amplifiers. *See* Brandt at page 1, paragraph 2. Brandt also states that Bayesian training improves the error-rates of MLPs. Here, however, Brandt does not disclose, teach, or even suggest any limitation of claim 12.

The next two paragraphs the Examiner cites are under Brandt's heading "The Circuit and Simulated Data Generation." Here Brandt describes the direct recording of resistances, voltages, and times from an amplifier circuit after the presentation of an impulse such as a Dirac impulse. *See* Brandt at page 7/3. Brandt states that recording data were "extracted" from these input pulse experiments. However, the statement in Brandt that recording data were extracted from experiments has nothing to do with the problem of "extraction" as is understood in the field of electronic design automation (EDA). Since Brandt does not describe EDA extraction, Brandt's recorded data values do not disclose, teach, or even suggest any of the limitations of claim 12 recited above.

The Examiner also cites page 7/2 paragraph 3 to page 7/4 paragraph 4 in Brandt to reject claims 19 and 20. On page 7/2, under the heading "The Bayesian Trained MLP," Brandt generally describes Bayesian trained MLPs. Finally, from pages 7/3 to 7/4, under the heading "Prediction Error Estimation," Brandt discusses predicting the errors of Bayesian trained MLPs using Bayesian statistical theory. However, here also, Brandt does not disclose, teach, or even suggest any of the limitations of claim 12 recited above because Brandt discusses Bayesian trained MLPs only in relation to predicting their error "bars" (error-rates based on variance and standard deviation).

Next the Examiner rejected claims 14 and 16 by citing page 7/4 and Figure 1 in Brandt. Regarding Figure 1, the Examiner states "wire and neural network are illustrating in Fig. 1." However, Applicants respectfully submit that no neural network is shown in Brandt's Figure 1. Brandt's Figure 1 only shows the differential amplifier circuit described by Brandt as being tested for error.

Moreover, Applicants respectfully submit that page 7/4 of Brandt discusses error estimation for resistance values of a faulty amplifier circuit. This has nothing to do with EDA extraction. Since Brandt discusses error estimation, Applicants respectfully submit that Brandt does not disclose, teach, or even suggest the limitations of claim 12.

Accordingly, Applicants respectfully submit that Brandt neither anticipates claim 12, nor otherwise renders this claim invalid. As claims 13-20 are dependent on claim 12, Applicants respectfully submit that claims 13-20 are also patentably distinguishable from Brandt by virtue of their dependence. In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the §102(b) rejection of claims 12, 14, 16, and 20 and the §103(a) rejection of claims 13, 15, and 17-19.

CONCLUSION

In view of the foregoing, it is submitted that all claims, namely claims 1-20, are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance is earnestly solicited at the earliest possible date.

Respectfully submitted,

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Dated: 08/09/2004

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